A STUDY ON CLINICAL FEATURES, SUCCESS RATE AND COMPLICATIONS OF ENDOTHERAPY IN CHOLEDOCHOLITHIASIS.

DISSERTATION SUBMITTED FOR DM MEDICAL GASTROENTEROLOGY
(BRANCH-IV)
AUGUST- 2010.

THE TAMIL NADU DR.MGR MEDICAL UNIVERSITY,
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CERTIFICATE

This is to certify that this dissertation entitled

"A Study on Clinical features, success rate and complications of endotherapy in choledocholithiasis" submitted by Dr.M.Manimaran, to the faculty of Medical Gastroenterology, The Tamilnadu Dr.MGR Medical University, Guindy, Chennai-600032, in partial fulfillment of the requirement for the award of DM., Degree Branch IV (Gastroenterology) is a bonafide work carried out by him under my direct supervision and guidance.

Prof.S.Jeevan Kumar,MD.,DM.,
Professor and HOD,
Department of Digestive Health and Diseases,
Government Peripheral Hospital, Anna Nagar,
Attached to Kilpauk Medical College,
Chennai-600010.

Dr.V.Kanagasabai,MD,
The Dean ,
Government Kilpauk
Medical College, Kilpauk,
Chennai-600010

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TABLE OF CONTENTS

INTRODUCTION

INTRODUCTION

Choledocholithiasis is defined as the occurrence of stones in the bile ducts. It is a common clinical problem worldwide. It has been estimated that 10–15% of patients undergoing cholecystectomy for symptomatic gallstones harbor concomitant stones in their CBD. Primary ductal stones formed de novo also add a further small percentage to the overall prevalence.

Like stones in the gallbladder, stones in the bile ducts may remain asymptomatic for years, and stones from the bile duct are known to pass silently into the duodenum, perhaps frequently.

Unlike stones in the gallbladder, which usually become clinically evident as relatively benign episodes of recurrent biliary pain, stones in the CBD, when they do cause symptoms, tend to present as life-threatening complications such as cholangitis and acute pancreatitis. Therefore, discovery of choledocholithiasis generally should be followed by some type of intervention to remove the stones.

Studies regarding choledocholithiasis in South India are very limited. Hence I have chosen to analyse various clinical presentations of choledocholithiasis, success rate and complications of endotherapy in those patients.

REVIEW OF THE LITERATURE

REVIEW OF LITERATURE

CBD stones are either primary or secondary. Primary stones arise within the biliary duct system, while secondary stones develop in the gallbladder and migrate to the CBD. In the United States, up to 85% of all CBD stones are secondary in origin.

Primary CBD stones are caused by conditions leading to bile stasis and chronic bactibilia. Up to 90% of patients with brown pigment CBD stones have bile culture results positive for bacteria. Primary duct stones are usually brown pigment stones. Brown stones differ from black pigment stones by having a higher content of cholesterol. Brown stones are soft and earthy in consistency and take the shape of the duct.

In Western populations, biliary stasis is secondary to factors such as sphincter of Oddi dysfunction, benign biliary strictures, sclerosing cholangitis, and cystic dilatation of the bile ducts. Bile stasis promotes growth of bacteria, which produce phospholipase A1, thus releasing fatty acids from biliary phospholipids. The duct epithelium and/or bacteria (eg, *Escherichia coli*) produce beta-glucuronidase in amounts sufficient to deconjugate bilirubin diglucuronide. The presence of free fatty acids, deconjugated bilirubin, and bile acids leads to the formation of insoluble

calcium bilirubinate particles. With the loss of bile acids, cholesterol becomes insoluble, resulting in the formation of biliary sludge. The sludge also contains mucin and bacterial cytoskeletons, which further aid in stone formation.

In Asian populations, infestation with *A lumbricoides* and *C sinensis* may promote stasis by either blocking the biliary ducts or by damaging the duct walls, resulting in stricture formation. Bactibilia is also common in these instances, probably secondary to episodic portal bacteremia. Some authors have suggested that the stones are formed because of the bactibilia alone and that the parasites presence is just a coincidence.

Secondary CBD stones arise from the gallbladder, migrate to the CBD, and have a typical spectrum of cholesterol stones and black pigment stones.

Bacteria can be cultured from the surface of cholesterol and pigment stones but not from the core, suggesting that bacteria do not play a role in their formation.

The prerequisites for the formation of cholesterol stones are

1.cholesterol supersaturation

2.stasis and

3.accelerated nucleation.

The sex of the patient, parity, obesity, weight loss, and genetics are risk factors for the development of cholesterol stones.

Black pigment stones typically occur in conditions in which bilirubin excretion is increased, as in hemolytic disorders and in situations associated with profound gallbladder stasis such as prolonged fasting and long-term parenteral nutrition. Pigment stones are more common in patients with cirrhosis and ileal disease, although the exact mechanism of stone formation under these conditions is not understood.

Gallstones may pass from the gallbladder into the CBD or can form de novo in the duct. Generally, all gallstones from one patient, whether from the gallbladder or CBD, are of one type, either cholesterol or pigment.

Cholesterol stones form only in the gallbladder, and any cholesterol stones found in the CBD must have migrated there from the

gallbladder. Black pigment stones, which are associated with old age, hemolysis, alcoholism, and cirrhosis, also form in the gallbladder and only rarely migrate into the CBD.

The majority of pigment stones in the CBD are the softer brown pigment stones. These stones form de novo in the CBD as a result of bacterial action on phospholipid and bilirubin in bile.[1] They are often found proximal to biliary strictures and are frequently associated with cholangitis. Brown pigment stones are found in patients with recurrent pyogenic cholangitis.[2]

Fifteen percent of patients with gallbladder stones also have CBD stones. Conversely, of patients with ductal stones, 95% also have gallbladder stones.[3]

In patients who present with choledocholithiasis months or years after a cholecystectomy, determining whether the stones were overlooked at the earlier operation or have formed since then may be impossible. Obviously, if the chemical composition of the CBD stones is determined, cholesterol or black pigment stones can be presumed to have been left behind after the original operation, whereas brown pigment stones can be presumed to have formed de novo since the cholecystectomy.[1]

In fact, formation of pigment stones in the CBD is also a late complication of endoscopic sphincterotomy.[4] In a study of the long-term consequences of endoscopic sphincterotomy in more than 400 patients, the cumulative frequency of recurrent CBD stones was 12%; all the recurrent stones were of the brown pigment type, irrespective of the chemical composition of the original gallstones. This observation suggests that sphincterotomy permits chronic bacterial colonization of the CBD that results in deconjugation of bilirubin and precipitation of pigment stones.

Stones in the CBD usually come to rest at the lower end of the ampulla of Vater. Obstruction of the bile duct raises bile pressure proximally and causes the ducts to dilate. Pressure in the CBD is normally 10 to 15 cm H_2O and rises to 25 to 40 cm H_2O with complete obstruction. When pressure exceeds 15 cm H_2O, bile flow decreases, and at 30 cm H_2O, bile flow stops.

The bile duct dilates to the point that it can be detected on either ultrasonography or abdominal CT in approximately 75% of cases. In the patient who has had recurrent bouts of cholangitis, the bile duct may become fibrotic and thus unable to dilate. Moreover, dilatation of the duct is sometimes absent in patients with choledocholithiasis because the obstruction is low-grade and intermittent.

CLINICAL FEATURES

Choledocolithiasis can present as following ways.

1. Abdominal pain
2. Obstructive jaundice
3. Cholangitis
4. Biliary pancreatitis and
5. Asymptomatic.

Pain

Dull right upper abdominal pain due to increased biliary tree pressure may also be experienced as a result of stone impaction.

Obstructive jaundice

Intermittent jaundice is said to be a typical feature of choledocholithiasis, when the stone impacts and disimpacts at the papilla or the distal CBD leading to fluctuating jaundice and serum bilirubin levels. Continuous obstruction from stone impaction in the distal common duct may manifest as progressive jaundice.

Clinical cholangitis

When bacterial infection superimposes in the obstructed biliary system, the patient presents with the typical Charcot's triad (fever, pain, and jaundice) of cholangitis. Nevertheless, cholangitis may not necessarily

present with all three features, and the diagnosis should not be dismissed lightly just because the patient is afebrile or not jaundiced.

Biliary pancreatitis

Small stones may pass spontaneously through the ampulla of Vater. The passage of stones across the papilla may induce a transient rise in the pancreatic duct pressure and trigger intrapancreatic activation of enzymes resulting in acute pancreatitis. Patients with acute pancreatitis typically present with epigastric pain radiating to the back, associated with nausea and vomiting. A serum amylase level exceeding 1000 IU/liter is considered to be diagnostic of pancreatitis.

The morbidity of choledocholithiasis stems principally from biliary obstruction, which raises biliary pressure and diminishes bile flow. The rate of onset of obstruction, its extent, and the amount of bacterial contamination of the bile are the major factors that determine the re-sulting symptoms.

Acute obstruction usually causes biliary pain and jaundice, whereas obstruction that develops gradually over several months may manifest initially as pruritus or jaundice alone.[5] If bacteria proliferate, life-threatening cholangitis may result.

The physical findings are usually normal if obstruction of the CBD is intermittent. Mild to moderate jaundice may be noted when obstruction has been present for several days to a few weeks. Deep jaundice without pain, particularly with a palpable gallbladder (Courvoisier's sign), suggests neoplastic obstruction of the CBD, even when the patient has stones in the gallbladder. With long-standing obstruction, secondary biliary cirrhosis may result, leading to physical findings of chronic liver disease.

Sometimes, results of laboratory studies may be the only clue to the presence of choledocholithiasis.[6] With bile duct obstruction, serum bilirubin and alkaline phosphatase levels both increase. Bilirubin accumulates in serum because of blocked excretion, whereas alkaline phosphatase levels rise because of increased synthesis of the enzyme by the canalicular epithelium. The rise in the alkaline phosphatase level is more rapid than and precedes the rise in bilirubin level.[7]

The absolute height of the serum bilirubin level is proportional to the extent of obstruction, but the height of the alkaline phosphatase level bears no relationship to either the extent of obstruction or its cause. In cases of choledocholithiasis, the serum bilirubin level is typically in the range of 2 to 5 mg/dL[5] and rarely exceeds 12 mg/dL.

Transient “spikes” in serum aminotransferase or amylase levels suggest passage of a common duct stone into the duodenum. The overall sensitivity of liver biochemical testing for detecting choledocholithiasis is reported to be 94%; serum levels of gamma glutamyl transpeptidase are elevated most commonly but may not be assessed in clinical practice.[7]

NATURAL HISTORY

Little information is available on the natural history of asymptomatic CBD stones. In many patients such stones remain asymptomatic for months or years, but available evidence suggests that the natural history of asymptomatic CBD stones is less benign than that of asymptomatic gallstones. [5] [8]

DIAGNOSIS

Ultrasonography actually visualizes CBD stones in only about 50% of cases, [60] whereas dilatation of the CBD to a diameter greater than 6 mm is seen in about 75% of cases. Ultrasonography can confirm or at least suggest the presence of CBD but cannot exclude choledocholithiasis definitively.

EUS, although clearly more invasive than standard ultrasonography, has the advantage of visualizing the CBD more accurately. In preliminary studies, EUS has excluded or confirmed choledocholithiasis with sensitivity and specificity rates of approximately 98% as compared with ERCP. [62]

ERCP is the standard method for the diagnosis and therapy of CBD stones, [9] with sensitivity and specificity rates of approximately 95%. However, less invasive studies, such as EUS and MRCP, should be performed first when the clinical probability of choledocholithiasis is low.[63]

Percutaneous transhepatic cholangiography (percutaneous THC) is also an accurate test for confirming the presence of choledocholithiasis. The procedure is most readily accomplished when the intrahepatic bile ducts are dilated and now is performed primarily when ERCP is unavailable or has been technically unsuccessful.

Laparoscopic ultrasonography is a new imaging modality employed in the surgical suite immediately before mobilization of the gallbladder during cholecystectomy. Preliminary studies suggest that laparoscopic ultrasonography may be as accurate as surgical

cholangiography in detecting CBD stones and may thereby obviate the need for the latter. [10]

DIFFERENTIAL DIAGNOSIS

Symptoms caused by obstruction of the CBD cannot be distinguished from those caused by obstruction of the cystic duct. Therefore, biliary pain is always in the differential diagnosis in patients with an intact gallbladder. The presence of jaundice or abnormal liver biochemical results strongly points to the bile duct rather than the gallbladder as the source of the pain.

In patients who present with jaundice, malignant obstruction of the bile duct or obstruction from a choledochal cyst may be indistinguishable clinically from choledocholithiasis .

Acute passive congestion of the liver, associated with cardiac decompensation, may cause intense RUQ pain, tenderness, and even jaundice with serum bilirubin levels higher than 10 mg/dL ; however, fever is usually absent, and the WBC count is normal or only slightly elevated. The patient typically has other obvious signs of cardiac decompensation.

Constrictive pericarditis and cor pulmonale also may cause acute congestion of the liver with only subtle cardiac findings.

Acute viral hepatitis rarely may cause severe RUQ pain with tenderness and fever. The WBC count, however, usually is not elevated, whereas serum alanine aminotransferase and aspartate aminotransferase levels are markedly elevated.

Acquired immunodeficiency syndrome (AIDS)–associated cholangiopathy[11] and papillary stenosis must be considered in human immunodeficiency virus–positive patients with RUQ pain and abnormal liver biochemical test results.

TREATMENT

Given its propensity to result in serious complications such as cholangitis and acute pancreatitis, choledocholithiasis warrants treatment in nearly all cases.[12] The optimal therapy for a given patient depends on the severity of symptoms, presence of coexisting medical problems, availability of local expertise, and presence or absence of the gallbladder.

CBD stones discovered at the time of a laparoscopic cholecystectomy present a dilemma to the surgeon. The operation can be

converted to an open cholecystectomy with CBD exploration, but this approach results in greater morbidity and a more prolonged hospital stay.

Alternatively, the laparoscopic cholecystectomy can be carried out as planned, and the patient can return for ERCP with removal of the CBD stones. Such an approach, if successful, cures the disease but runs the risk of necessitating a third procedure, namely a CBD exploration, if the stones cannot be removed at ERCP. In general, the greater the expertise of the therapeutic endoscopist, the more inclined the surgeon should be to complete the laparoscopic cholecystectomy and have the CBD stones removed endoscopically.[12]

In especially high-risk patients, endoscopic removal of CBD stones may be performed without cholecystectomy. This approach is particularly appropriate for elderly patients with other severe illnesses.[13] Studies indicate that cholecystectomy is required subsequently for recurrent symptoms in only 10% of patients.

TREATMENT OF CHOLEDOCHOLITHIASIS

Choledocholithiasis may be detected at the same time that gallbladder stones are discovered during an evaluation for biliary tract

symptoms, during a cholecystectomy, or after a cholecystectomy. Several management options are available, including dissolution therapy, interventional radiologic and endoscopic techniques, and surgery. Which management strategy is most appropriate for a given patient depends on the clinical presentation (jaundice, cholangitis, pancreatitis, or absence of symptoms), status of the gallbladder, and age and general condition of the patient. Additional factors to consider are the expertise of the available endoscopic, radiologic, and surgical specialists.

CHOLEDOCHOLITHIASIS KNOWN PREOPERATIVELY

When choledocholithiasis is known to exist before cholecystectomy, an acceptable option is to clear the common bile duct with endoscopic papillotomy and then proceed with laparoscopic cholecystectomy. [16,17] Alternative approaches include open or laparoscopic cholecystectomy with a common bile duct exploration.

The results of small, randomized trials suggest that there are no important differences in the efficacy and safety of precholecystectomy endoscopic sphincterotomy and open common bile duct exploration. [18] [19] Another study has shown the efficacy and safety of precholecystectomy endoscopic sphincterotomy and laparoscopic cholecystectomy with a

laparoscopic bile duct exploration to be equivalent.[20] The laparoscopic approach resulted in fewer procedures and a shorter overall hospital stay.

CHOLEDOCHOLITHIASIS IDENTIFIED DURING CHOLECYSTECTOMY

If unsuspected choledocholithiasis is identified on cholangiography during laparoscopic cholecystectomy, the following three options are available: (1) conversion to an open operation with a common bile duct exploration; (2) laparoscopic common bile duct exploration (via choledoscopy); and (3) completion of the laparoscopic cholecystectomy followed by postoperative endoscopic sphincterotomy and stone extraction.

Factors that influence the choice of treatment include the number and location of common duct stones, the presence of associated ductal disease, and the skill and experience of the surgeon and endoscopist. Completion of the laparoscopic cholecystectomy followed by postoperative endoscopic sphincterotomy is satisfactory for most patients and has the advantage of preserving the minimally invasive approach.

However, endoscopic sphincterotomy may be technically unsuccessful in 5% to 10% of patients, even in the hands of a skilled

endoscopist, and complete bile duct clearance of stones is possible in only 70% to 80% of patients.[21] In the patients in whom an initial endoscopic sphincterotomy is unsuccessful, a second attempt may be required.

Growing experience has shown that laparoscopic common bile duct exploration is safe and effective. Stone clearance rates average 95%, with an operative mortality rate of 0.5%. [20] [22] [23]

Laparoscopic common bile duct exploration compares favorably with endoscopic sphincterotomy in terms of efficacy, cost, and safety. [24] [25] Stones are removed via the cystic duct.

On the rare occasions that bile duct stones are too large or are located above the insertion of the cystic duct, a transcholedochal approach is needed, followed by bile duct closure over a T-tube left in the bile duct with the "T" brought out through the skin, to prevent stricturing of the bile duct.

A T-tube may also be left in the bile duct when stone evacuation is incomplete, to allow decompression and percutaneous stone extraction.

CHOLEDOCHOLITHIASIS IDENTIFIED AFTER CHOLECYSTECTOMY

Choledocholithiasis identified in patients who have previously undergone cholecystectomy is best managed with endoscopic sphincterotomy and stone extraction. If a T-tube is still present from a recent common bile duct exploration, radiologic extraction of the stone via the T-tube tract is usually possible. Surgery rarely is required in this situation.

ENDOSCOPIC INTERVENTION

ERCP was first described by McCune and coworkers in 1968.[26] Technologic advances in video endoscopy have improved image resolution, facilitated the teaching of advanced procedures, and permitted the digitization of radiographic and endoscopic images. Patients who undergo endoscopic intervention usually receive sedation and analgesia (conscious sedation), and only rarely general anesthesia.

The side-viewing endoscope has a viewing field that is perpendicular to the long axis of the instrument to permit better visualization of the medial wall of the descending duodenum, the usual location of the duodenal papilla. Selective cannulation of the biliary tree and diagnostic

ERCP is the first step in a therapeutic procedure. Various diagnostic and therapeutic duodenoscopes with channels of different sizes are available. “Mother-daughter” scopes (cholangioscopes that can be inserted through a 4.2-mm channel of a standard duodenoscope) are available.

Forward-viewing instruments may be better for locating the papilla in a patient with a Billroth II gastrojejunostomy, although a side-viewing duodenoscope is still preferred because of its elevator. The most versatile approach is to use a duodenoscope with a small insertion tube and 4.2-mm channel for all interventions. Reusable accessories help keep costs down but require reliable sterilization.[27]

Complications associated with diagnostic and therapeutic cholangiography include infection, bleeding, pancreatitis,[28] retroduodenal perforation,[29] and impaction of a stone or retrieval basket. Complications of varying severity occur in 5% to 10% of endoscopic biliary interventions, and increased experience by the endoscopist results in fewer complications.[30]

Duodenal perforation and pancreatitis are more common in patients with papillary stenosis than in those with other biliary disorders, and the risk of bleeding is greater in patients with papillary tumors. Prophylactic use of somatostatin or gabexate mesylate may reduce the risk of pancreatitis;

however, these agents are not used routinely because of controversy related to their efficacy, patient selection, ease of administration, and cost. [31] [32] [33]

The risk of post-ERCP pancreatitis is higher in women, in patients with sphincter of Oddi dysfunction, in those with previous ERCP-associated pancreatitis, in patients in whom the pancreatic duct is filled excessively with contrast dye, and in those in whom a precut papillotomy is performed.[34]

In general, the risk of complications is not higher in patients with a duodenal diverticulum, although the vascular supply to the papilla is distorted.[29] Patients in whom an obstructed cystic duct is seen at ERCP are probably at increased risk of acute cholecystitis after endoscopic sphincterotomy for CBD stones.[30] Late complications of ERCP include acute cholecystitis, stenosis of the papilla, cholangitis, and retained or new CDB stones.

Previous surgery, such as a Billroth II gastrojejunostomy or Roux-en-Y choledochojejunostomy, makes ERCP difficult or impossible. A major complication in a patient with a Billroth II anatomy is bowel perforation of the afferent limb, which may require surgical intervention.[35] Uncorrectable coagulopathy also is associated with increased risk and may

represent a contraindication to ERCP and especially endoscopic sphincterotomy.

As noted earlier, inexperience of the biliary endoscopist (<200 cases per year) and use of a precut papillotomy to gain access to the bile duct are independent risk factors for major complications.[36]

The routine use of antibiotics prior to ERCP is controversial, but oral antibiotic prophylaxis appears to be safe and cost-effective in patients undergoing therapeutic ERCP. [37] [38] Adequate sedation is of the utmost importance, and if standard sedation and analgesia are not possible or are too dangerous, general anesthesia must be considered. Midazolam (a benzodiazepine) and meperidine (a narcotic) are generally administered.

In the past, droperidol was often used with midazolam and meperidine to facilitate sedation in patients who were otherwise difficult to sedate. Because droperidol prolongs the QT interval, however, and can lead to cardiac arrest when used in combination with certain drugs, the FDA has issued a warning about the use of droperidol, along with the requirement for a pre-procedure electrocardiogram (ECG) and 2 hours of continuous ECG monitoring after the procedure. This requirement has eliminated the use of

droperidol during ERCP. Diphenhydramine and pro-methazine are now used in its place.

Nowadays, propofol is used to achieve sedation in patients undergoing ERCP. This agent can quickly cause respiratory depression and should be administered only by persons with appropriate training. Silent myo-cardial ischemia has been reported to occur much more frequently than previously appreciated during ERCP, although the clinical implication of silent ischemia is not clear.[39]

The duodenal papilla usually is identified without difficulty.[40] In patients with a normal anatomy, cannulation of the papilla is usually successful, but to achieve better than a 95% success rate, a precut papillotomy may be needed.[41] Neither cholangitis nor pancreatitis is a contraindication to ERCP if a thera-peutic maneuver is being considered. Competence in therapeutic ERCP requires specialized training and mentoring.[42] When an attempt at ERCP fails, the patient may need to be referred to a specialized center with a more experienced endoscopist trained in advanced techniques.

Success rates higher than 96% with an acceptable complication rate of 10% should be expected. [43] [44] [45] [46] New cannulation techniques are

always being developed.[47] Storage of data and images is particularly important with therapeutic procedures; the precise anatomy must be delineated for surgical and radiologic colleagues.

Patients can often be discharged home after a therapeutic ERCP, but those who experience pain after the procedure, have had pancreatitis in the past, have suspected sphincter of Oddi dysfunction, have cirrhosis, or have had a difficult cannulation or a precut papillotomy are at higher risk of a complication and should be admitted to the hospital for observation. [48] [49] [50] [51] [52]

ENDOSCOPIC SPHINCTEROTOMY

Endoscopic sphincterotomy is the preferred therapy for retained CBD stones and is successful in more than 90% of cases.[53]

TECHNIQUE

The sphincter muscle is cut at the ampulla with a unipolar blended current applied through a sphincterotome (i.e., a polytetrafluroethylene catheter with a threaded piece of conducting wire at its end). Sphincterotomes are available with different configurations—pull, push, and needle-knife.

The landmark that helps determine the safe extent of the cut is the intraduodenal portion of the CBD. As a general rule, the incision of the sphincterotomy is stopped when it reaches the transverse fold located superior to the papilla. The blood supply to this area can be variable, especially in the presence of a diverticulum. The cut is performed with short bursts of current, so that the disruption is accomplished with minimal transmural burn, good coagulation, and minimal "unzipping." Most sphincterotomes accept a guidewire for greater security.

The size of the sphincterotomy is determined by the therapeutic objectives (i.e., when a large stone is to be removed, the required cut is larger than when the papillary opening must be enlarged slightly to permit placement of an endoprosthesis).

Occasionally, a precut sphincterotomy is performed to assist passage of the diagnostic catheter, and on some occasions, a needle-knife is employed in place of a sphincterotome to gain access to a bile duct that is totally obstructed or that cannot be cannulated. Rarely, a choledochoduodenal fistula may be created in the supra-ampullary area when the ampulla is totally occluded by a tumor or stone.

STONE REMOVAL

Except under exceptional circumstances (i.e., aberrant anatomy or uncorrectable coagulopathy) an endoscopic sphincterotomy is performed prior to removal of a stone in the bile duct. Stones in the CBD may pass spontaneously with the initial gush of bile that follows endoscopic sphincterotomy, or they may be retrieved easily with an occlusion balloon or wire basket.

When the bile duct cannot be entered, a needle-knife is used to cut into the duct. The safety of this technique is operator dependent; bleeding, perforation, and incomplete cuts occur more commonly in inexperienced than in experienced hands. With a dilated bile duct and a longer intraduodenal ductal segment, the risk of complications associated with use of a needle-knife is less.

Balloon dilation of the papilla prior to removal of small stones has achieved some popularity because of uncertainty about the long-term effects of endoscopic sphincterotomy and the desire to eliminate the risks associated with it. The stone is extracted after the papilla is dilated, and the competence of the papilla is preserved. Some investigators continue to have

concerns about pancreatitis associated with dilation of the papilla. Clearly, balloon dilation is not suitable for removal of large stones (>1 cm).[54]

Long-term use of an endoprosthesis for stone disease is questionable, particularly when the projected survival of the patient exceeds a year. There is a risk of sepsis despite the oral administration of ursodeoxycholic acid to prolong the patency of a plastic stent. The use of metal stents for stone disease is untested; such stents typically become occluded within a year and cannot be removed. [55] [56]

Large CBD stones (>1.5 cm) may require a more sophisticated technique for removal, such as (1) mechanical lithotripsy, (2) piezo-mechanical lithotripsy, (3) laser lithotripsy,[57] or (4) ESWL after placement of a naso-biliary catheter to target the stone correctly. If a stone is left behind, placement of a short stent in the bile duct or a nasobiliary catheter is often advisable to prevent impaction of the stone until definitive therapy is undertaken.

Large CBD stones that cannot be removed from a patient with a low surgical risk represent an indication for surgery. In general, when choledocholithiasis and cholelithiasis coexist, the CBD stones are removed via ERCP, and laparoscopic cholecystectomy is then performed.

If an elective open cholecystectomy is planned, preoperative ERCP may have greater morbidity than a CBD at the time of cholecystectomy. In patients who do not undergo a cholecystectomy after endoscopic sphincterotomy to remove CBD stones, the risk of acute cholecystitis is approximately 5.9% after a mean of 7.7 years of follow-up.[58] ERCP in patients with gallstone pancreatitis is generally reserved for patients who are severely ill and those with jaundice, cholangitis, or nonresolving pancreatitis.[59]

CHOLANGITIS

Of all the complications of gallstones, cholangitis kills most swiftly. Pus under pressure in the bile ducts leads to rapid spread of bacteria via the liver into the blood, with resulting septicemia. Moreover, the diagnosis of cholangitis is often problematic (especially in the critical early phase of the disease), because clinical features pointing to the biliary tract as the source of sepsis are often absent.[80]

Careful evaluvation of the symptoms, signs, and laboratory findings that can aid in an early diagnosis of cholangitis.

Etiology and Pathophysiology

In approximately 85% of cases, cholangitis is caused by an impacted stone in the CBD, with resulting bile stasis.[81] Other causes of bile duct obstruction that may result in cholangitis are neoplasms, biliary stricture, parasitic infections, and congenital abnormalities of the bile ducts. This discussion deals specifically with cholangitis caused by gallstones in the CBD.

Bile duct obstruction is necessary, but not sufficient, to cause cholangitis. Cholangitis is relatively common in patients with choledocholithiasis and nearly universal in patients with post-traumatic bile duct stricture but is seen in only 15% of patients with neoplastic obstruction of the CBD. It is most likely to result when a bile duct that already contains bacteria becomes obstructed, as is the case in most patients with choledocholithiasis and stricture but in few patients with neoplastic obstruction.

Malignant obstruction is more often complete than obstruction by a stricture or a CBD stone and less commonly permits the reflux of bacteria from duodenal contents into the bile ducts.[82]

Clinical Features

The hallmark of cholangitis is Charcot's classic triad, consisting of RUQ pain, jaundice, and fever. The full triad is present in only 70% of patients.[82] Altered mental status and hypotension in combination with Charcot's triad, known commonly as Reynolds's pentad, occur in severe suppurative cholangitis.

On physical examination, fever is almost universal, occurring in 95% of patients. RUQ tenderness is elicited in approximately 90% of patients, but jaundice is clinically detectable in only 80%. Notably, peritoneal signs are found in only 15% of patients. The combination of hypotension and mental confusion indicates gram-negative septicemia. In overlooked cases of severe cholangitis, intrahepatic abscess may manifest as a late complication.

Diagnosis

The principles of radiologic diagnosis of cholangitis are the same as those for choledocholithiasis. Stones in the CBD are seen ultrasonographically in only about 50% of cases but can be inferred by detection of a dilated CBD in about 75% of cases.

Normal ultrasonography findings do not exclude the possibility of choledocholithiasis in a patient in whom the clinical presentation suggests cholangitis.

EUS and MRC, have a much higher accuracy rate than CT for detecting and excluding stones in the CBD.

ERCP is the standard test for the diagnosis of CBD stones and cholangitis. Moreover, the ability of ERCP to establish drainage of infected bile under pressure can be life-saving. If ERCP is unsuccessful, percutaneous THC can be performed.

Treatment

In suspected cases of bacterial cholangitis, blood culture specimens should be obtained immediately and therapy started with antibiotics effective against the likely causative organisms.[83]

In mild cases, initial therapy with a single drug, such as cefoxitin, 2.0 g intravenously every 6 to 8 hours, is usually sufficient. In severe cases, more intensive therapy (e.g., gentamicin, ampicillin, and metronidazole) is indicated.

GALLSTONE PANCREATITIS

Initial management of patients with gallstone pancreatitis involves fluid resuscitation, bowel rest, and monitoring for complications. The majority of patients have a relatively mild illness that resolves clinically within 1 week with conservative management.

The presence of cholelithiasis should be determined with ultrasonography early in the course of treatment of a patient with acute pancreatitis. For most patients with cholelithiasis, laparoscopic cholecystectomy should be performed before discharge. In the past, cholecystectomy early in the course of gallstone pancreatitis carried significant risk; for that reason, cholecystectomy was delayed for 1 to 2 months to allow resolution of pancreatic inflammation.

A major disadvantage of this delayed approach was that up to one half of patients had further attacks of pancreatitis while awaiting surgery. It is now recognized that cholecystectomy may be performed safely during the same hospitalization once the clinical signs of pancreatitis have resolved. [71] [72] [73] This approach shortens the total duration of both illness and hospitalization. Additionally, it prevents subsequent recurrent pancreatitis. Cholangiography should be performed during the

cholecystectomy to exclude residual common bile duct stones, as recommended by the International Association of Pancreatology.[74]

In patients with severe or necrotizing pancreatitis, surgery is delayed for several weeks to allow

(1) the patients to recover from the sequelae of pancreatitis;

(2) inflammation of the hepatoduodenal ligament to subside, thereby permitting safe allowing surgical dissection; and

(3) identification of patients in whom pancreatic pseudocysts develop and who thus may require additional surgical treatment.[75]

A small subset of patients with necrotizing gallstone pancreatitis, particularly those with jaundice or cholangitis, appear to benefit from early endoscopic sphincterotomy and clearance of the common bile duct. [76] [77]

Common bile duct stones are found in a substantial fraction of such patients when sphincterotomy is performed within the first 24 to 48 hours of hospitalization. The morbidity of this approach is less than that of early surgery with common bile duct exploration.

Most patients in whom endoscopic sphincterotomy is performed for gallstone pancreatitis should undergo elective cholecystectomy once the pancreatitis has subsided.

In elderly patients or patients in whom surgery poses a high risk, cholecystectomy may be deferred, but further symptoms of gallstone disease may be expected in up to 25% on long-term follow up.[78] The risk of symptomatic gallstone disease is higher in patients in whom cystic duct obstruction is identified at cholangiography than in those without cystic duct obstruction.[79]

AIM OF THE STUDY

OBJECTIVES OF THE STUDY

1. To study the various clinical presentations of choledocholithiasis.
2. To study the success rate of endotherapy in choledocholithiasis.
3. To study the complications of endotherapy in choledocholithiasis.
4. To study the epidemiology of choledocholithiasis.
5. To study the associated conditions with choledocholithiasis.

MATERIALS
&
METHODS

MATERIALS AND METHODS

This is a prospective study conducted in DDHD, Government peripheral Hospital, Anna Nagar, Chennai – 102 from April 2008 to December 2009.

INCLUSION & EXCLUSION CRITERIA:

1. All patients with CBD stones who underwent ERCP were included in this study.
2. Patients with CBD stones not willing for ERCP were excluded from this study.
3. Patients with CBD stones who were all not fit for ERCP excluded.
4. Patients with obstructive jaundice other than CBD stones were excluded.

All patients were explained about the procedure and its complications. We got informed consent from all the patients. ERCP was performed by the Professor and the Associate Professor of our department. All patients received premedications Inj. pentazocine 30mg (1cc), Inj.promethazine 50mg (2cc), Inj. hyoscine butylbromide 20mg (1cc), and Inj.midazolam 2mg I.V.

Positioning of the patient

ERCP is usually performed with the patient lying prone. It is important, however, to note that gravity will favor filling of specific parts of the pancreaticobiliary system with the patient in different positions. Turning the patient during ERCP examination may sometimes be necessary to eliminate overlapping shadows from superimposed bowel gas, bony structures, or the duodenoscope. This can also be achieved to some extent by rotation of a C-arm. Head up or down tilting of the X-ray table helps gravity drainage to fill the intrahepatic system or the distal common duct.

At the end of the procedure, additional radiographs may be taken with the patient in a supine position. A change of position allows gravity to fill the more dependent portion of the right intrahepatic system and also the tail of the pancreas.

Positioning the patient in the right oblique position moves CBD off the spine and may reveal the cystic duct which sometimes overlaps with the CBD. This position may also allow a better examination of the gallbladder.

In rare circumstances, ERCP may be performed with the patient in a supine position. The endoscopist will have to adjust the position by rotating more to the right, or even work facing away from the X-ray table.

Cannulation with sphincterotome

Cannulation of the common duct is usually done with ERCP cannula. Some patients may have stones impacted at the lower end of the common duct and the resultant bulging papilla could render cannulation more difficult. A cannulating sphincterotome with an adjustable tip may facilitate cannulation of the bile duct in this situation by lifting the roof of the papilla. The use of a hydrophilic guidewire under such circumstances may also help in selective cannulation.

Deep cannulation of the bile duct should be confirmed by injecting a small amount of contrast through the sphincterotome or by gently wiggling the sphincterotome under fluoroscopy.

Precut sphincterotomy for failed deep cannulation

A needle-knife sphincterotome can be used to incise the lower end of the common duct when guidewire cannulation of the bile duct fails. In a recent prospective study by Binmoeller et al., precut papillotomy was performed on 123 out of 327 patients who had an unsuccessful CBD

cannulation [84]. Selective cannulation was achieved in all cases after the procedure, without a significant increase in the rate of pancreatitis and bleeding when compared to those undergoing the conventional pull-type endoscopic sphincterotomy.

Complications of precut sphincterotomy

Today, the overall incidence of complications following precut sphincterotomy has been reported to be 7–11%, which is not much higher than that quoted for conventional sphincterotomy [85,86]. However, it cannot be overemphasized that these figures were mostly produced by experienced endoscopists in worldrenowned centers. The mortality and morbidity rates could have been higher if the procedure had been performed by trainees or by the less experienced.

Sphincterotomy

A guidewire is inserted through the lumen of the cannulotome once deep cannulation is confirmed, so that access to the bile duct can be assured in subsequent exchange maneuvers. The cutting wire is then bowed so that it is in contact with the roof of the papilla. The incision is made in a stepwise manner in the 11–1 o'clock direction along the longitudinal fold. To avoid an uncontrolled 'zipper' cut, minimal tension is applied to the wire.

The electrocautery unit should be set with a high cutting current blended with a low coagulation current.

The size of the sphincterotomy can vary but it should be limited to the junction between the duodenal wall and the intraduodenal portion of the ampulla of Vater, which often appears as a semicircular mucosal fold above the papilla.

Rendezvous procedure (two-hands technique)

A guidewire is passed through the percutaneous catheter down to the common duct and duodenum, which is to be picked up by a snare inserted through a duodenoscope. The guidewire is pulled out from the biopsy valve of the duodenoscope and a wire-guided sphincterotome is threaded over the guidewire into the common duct.

Subsequent endoscopic sphincterotomy and stone extraction can be performed in the standard manner. In a series reported by Calvo et al., the success rate for clearing the CBD with a rendezvous approach was 93% (13/14) [87]. Only one complication was encountered, retroperitoneal perforation during sphincterotomy. This approach is an extremely good option for patients with poor surgical risks and refractory choledocholithiasis.

We used rendezvous technique in one patient, in whom cholecystectomy state with T tube in situ.

Stone extraction

After endoscopic sphincterotomy, stones in the biliary tree can be removed with either a basket or a balloon catheter. We generally prefer a retrieval balloons than dormia basket.

Basket stone extraction

In brief, the closed basket covered by its plastic sheath is inserted into the common duct through the therapeutic channel of the duodenoscope. Inside the bile duct, the basket is gently opened and contrast is injected to confirm its position and relation to the biliary calculi.

Care must be taken when opening the basket because stones in the main duct may be displaced upward and become trapped in one of the intrahepatic ducts. It is also advisable to remove stones lying in the distal CBD before making any attempts to retrieve stones located in the proximal duct. Vigorous shaking of the fully open basket inside the bile duct may help to bring the stones into the basket.

Once the stones are captured, the basket is withdrawn slowly without closure. Closure of the basket at this juncture may disengage the

stones. When the basket and stones are withdrawn to the level of papillotomy, the duodenoscope is gently pushed in with a right rotational movement. This maneuver helps straighten the tip of the duodenoscope, and exerts a traction force along the axis of the CBD which facilitates the removal of the stones, and avoids damage to the papilla or duodenum. By repeating the above maneuver, multiple ductal stones < 1 cm in diameter can be removed in the same ERCP session

Balloon stone extraction

Biliary stones in the CBD of < 1 cm in diameter can be removed with a balloon catheter. The balloon is deflated and inserted into the CBD through the sphincterotomy, and advanced above the stones. The balloon is gently inflated to the size of the bile duct and pulled back gently, displacing the CBD stone distally.

With an adequate sphincterotomy, the stone can be pulled against the cut orifice and then expelled by traction on the balloon catheter followed by downward angulation of the tip of the endoscope. The maneuver is repeated and complete clearance of the CBD is confirmed by an occlusion cholangiogram.

The challenge: giant CBD stones

The ordinary endoscopic methods described above are suitable for stones around 1 cm in size. For stones > 1.5 cm in diameter, endoscopic retrieval becomes difficult, if not impossible. Several options are available to tackle the situation. They are basket mechanical lithotripsy, electrohydraulic lithotripsy, intraductal laser lithotripsy, stenting and interval endoscopic lithotripsy, and Extracorporeal shock-wave lithotripsy (ESWL).

Effects of stenting on CBD stones

The exact mechanism causing the change in the size of stones is unclear, but improvement in the solubility of bile after drainage as well as the mechanical friction between stents and calculi are thought to be responsible.

The need for stone extraction after stenting

Temporary drainage and decompression of the biliary system by a plastic stent are a valid option for high surgical risk patients whose stones are too big for endoscopic retrieval at the outset.

However, in a prospective randomized trial by Chopra et al., significantly more long-term biliary complications were observed in patients treated with endoprosthesis as compared to those with complete ductal clearance [88]. Thus it is highly advisable to clear all common duct calculi

and reserve stenting as a definitive treatment only for those who are extremely unfit for other procedures.

All patients with CBD stones underwent biliary sphinterotomy, along with either balloon trolleying or basketing and stenting. All patients' clinical features, success rate and complications of endotherapy were documented.

We used PENTAX Video Duodenoscope of length 156 cms, working channel diameter of 4.2mm, field of view 110 degrees [Model No: ED 341 C Batch No: A120052] with a PENTAX Video Processor EPK 150C input 100-240 V – 50/60 HZ ranging 300VA Max.

We used ERBE ENDOCUT [Model ICC 200 EA INT] for biliary sphincterotomy with cutting current 120 effect 3 without coagulation.

We used ERCP cannulas - Fluro tip [Triple Lumen with Curved Tip], Guide wires Zebra 0.035" 450 cms [Bavarian wire, Medi – Globe], X –Wire [ConMed] ,Biliary Stone Extraction Balloon – Inflated balloon size 14 – 16 mm [Medi –Globe], Wilson-Cook Triple Lumen Bow Sphincterotome, Triple Lumen Needle Knife Sphincterotome,[Wilson-Cook Cutting wire 4mm], Sohendra Biliary Dilatation Catheters [7 Fr, 10 Fr], Web Extraction Basket 2cms × 4 cms [Cook Medical], OASIS 10 Fr [One

Action Stent Introduction System], Stent Pusher 7 Fr, Biliary stents 7 Fr, 10 Fr [Double Pigtail, Amsterdam] of varying lengths.

Cholangiogram was done by using IOHEXOL USP equiv. to 350 mg of Iodine [Omnipaque] .

Patients with CBD stones are divided into three groups.

Group 1- Patients with CBD stones with GB stones.

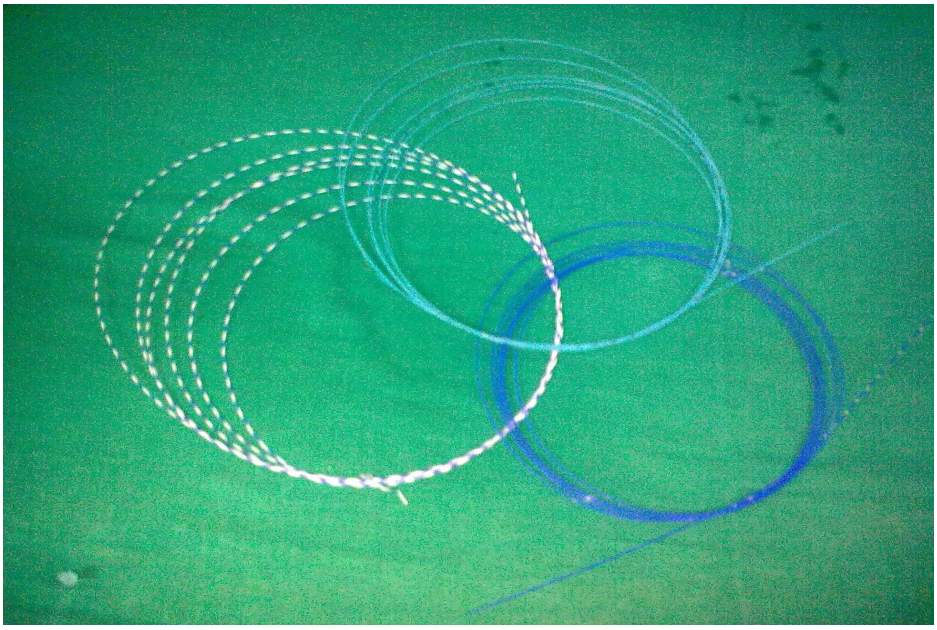
Group 2- Patients with CBD stones with no stones in GB.

Group 3- Patients with CBD stones in postcholecystectomy state.

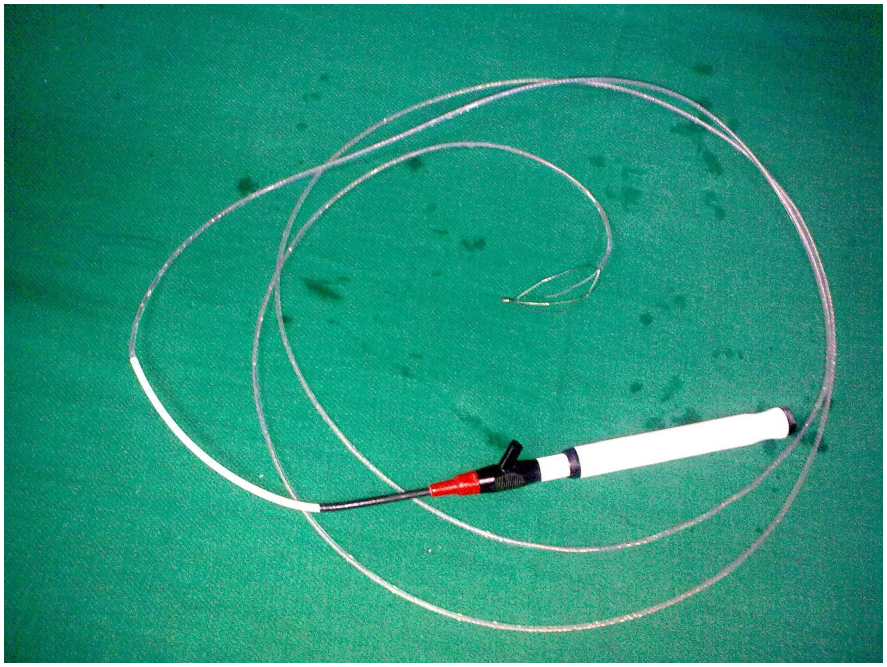
STATISTICAL METHODS:

The statistical software package SPSS for Windows version 15 [SPSS Inc, Chicago, III] was used to analyse the data. Means and Standard deviations were used to summarize data for continuous variables whereas percentages were used for categorical variables.

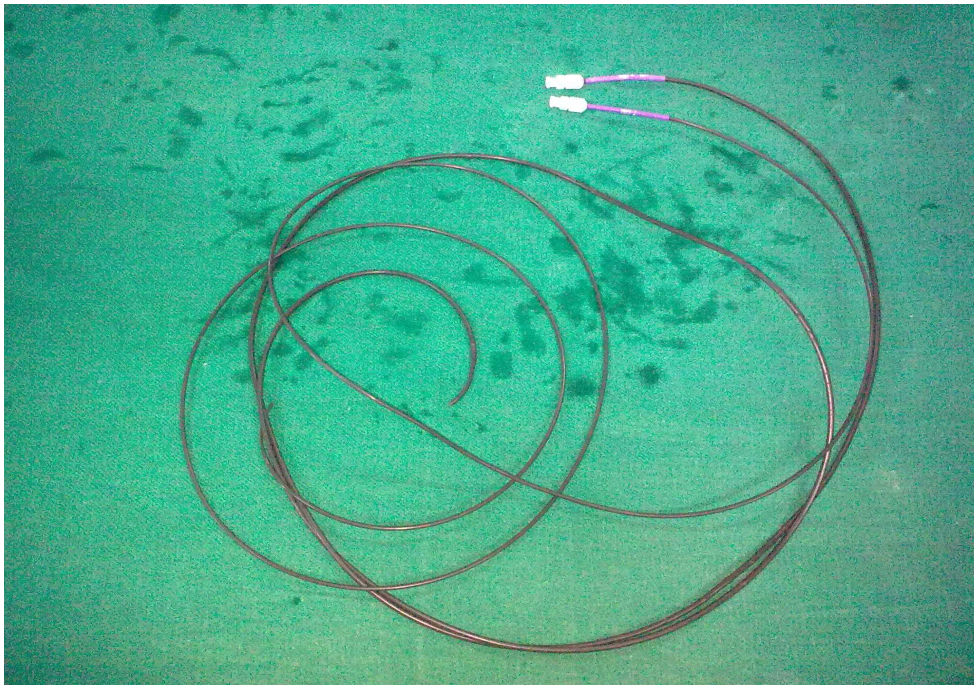
GUIDE WIRE



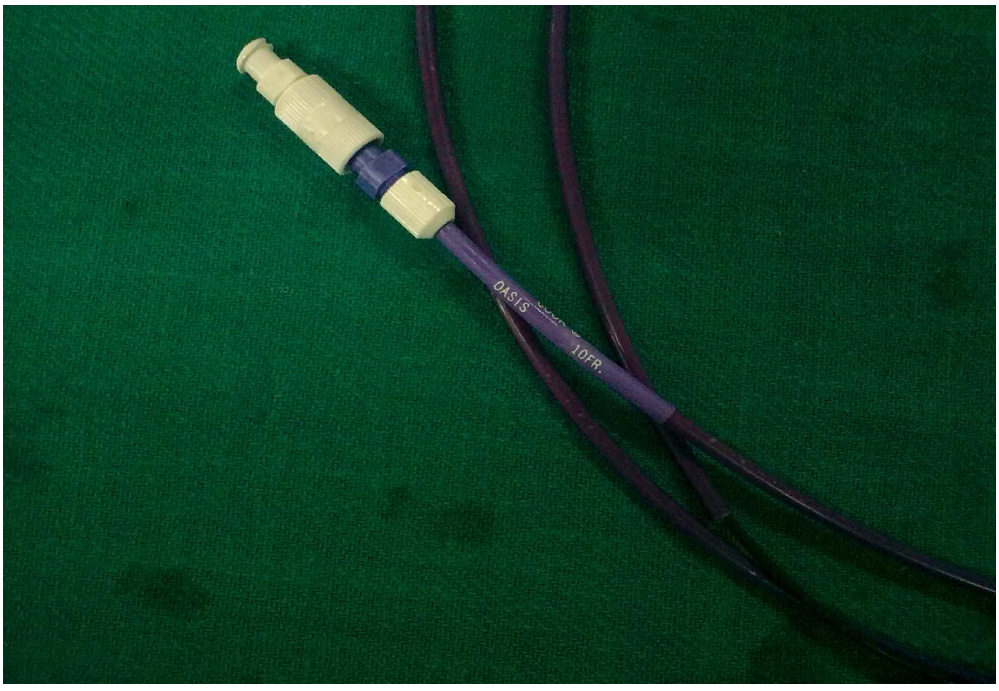
DORMIA BASKET



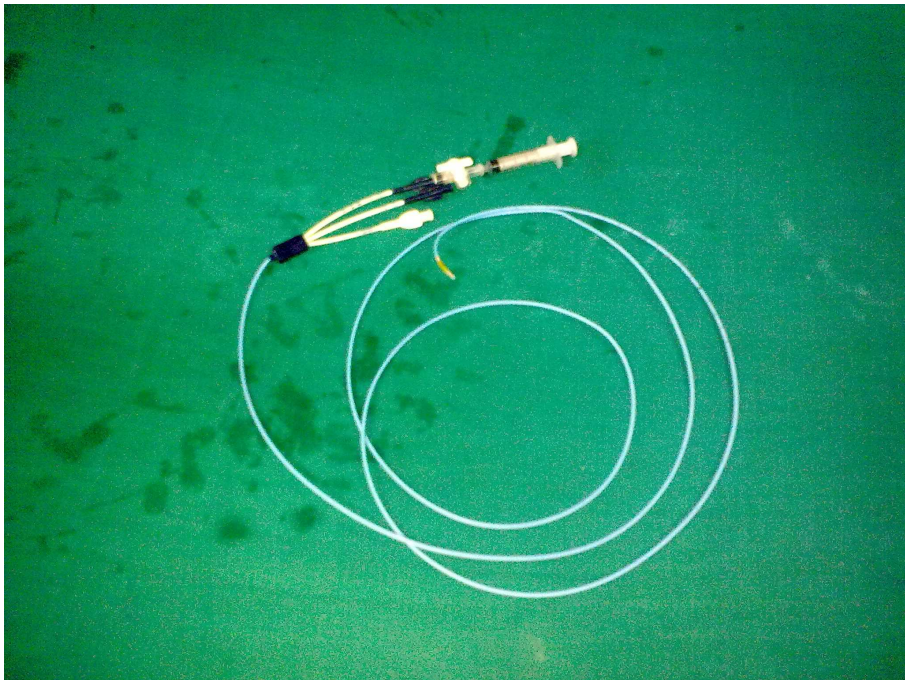
SOHENDRA BILIARY DILATATORS



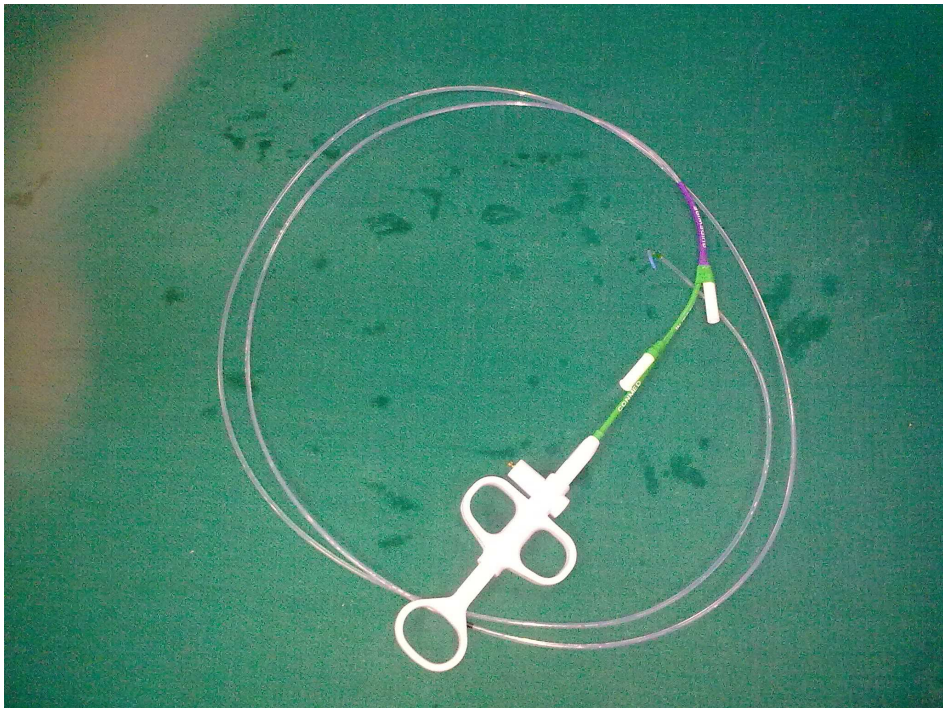
OASIS



BALLOON

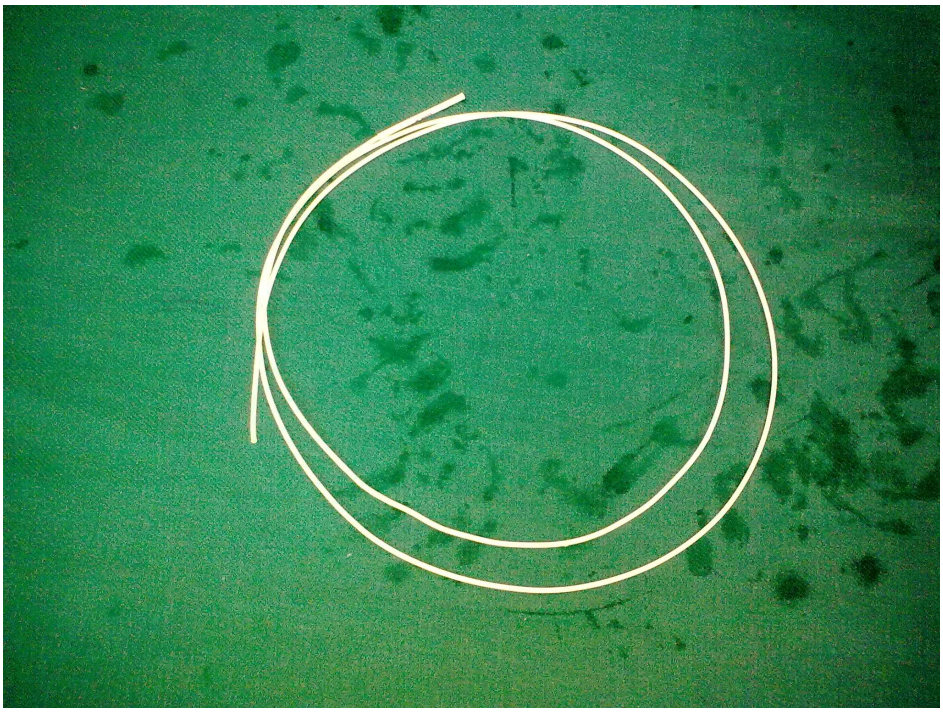


BOW SPHINCTEROTOME



S

STENT PUSHER



ERBE ENDOCUT

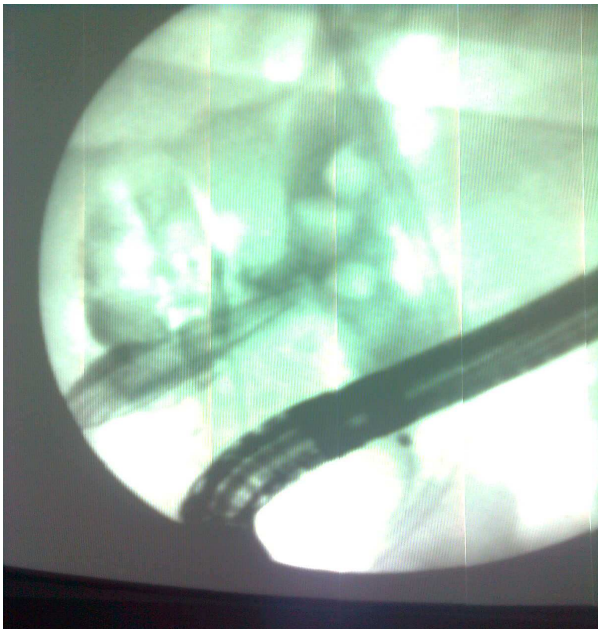
S

CHOLESTRON STONES

PIGMENT STONE

s

CHOLANGIOGRAM SHOWS CBD STONES



PIGMENT STONES

S

RESULTS

RESULTS

In this study, the patients were divided into three groups.

Group 1- Patients with CBD stones with GB stones.

Group 2- Patients with CBD stones with no stones in GB.

Group 3- Patients with CBD stones in postcholecystectomy state

Total number of patients underwent ERCP in our study were 115. Out of which 51 were males and 64 were females. Overall success rate was 91.3%. Failure rate was 8.69%. The procedure was successful in 95 patients in first attempt, 12 patients in second attempt, and 8 patients in third attempt.

Abdominal pain was the presenting symptom in 70 [60.86%] patients, Jaundice in 44 [38.26%], Fever in 42 [36.52%], Charcots triad in 38 [33.04%], Biliary pancreatitis in 6 [5.21%], Asymptomatic in 4 [3.47%] patients.

38 patients developed post procedural abdominal discomfort, 13 patients developed pancreatitis [Mild-9, Moderate -4, and Severe - 0], and 2 patients had retroduodenal perforation. No post sphincterotomy bleeding noted. No procedure related mortality was noted in this study.

Biliary ascariasis was seen in one patient, choledochal cyst type 1 was seen in 2 patients, periampullary diverticulum was seen in 15 patients, distal CBD stricture was seen in 19 patients.

Group 1- Patients with CBD stones with GB stones

Total number of patients in this group were 62 (male 29, female 33). Mean age of 51.16 yrs. Success rate in this group was 90.32% (56/62). Failure rate was 9.67% (6/62). The procedure was successful in 1st attempt in 54 pts, 2nd attempt in 5 pts, and 3rd attempt in 5 pts.

Pain was the predominant presenting symptom in 64.5%, followed by jaundice in 32.25%, and fever in 27.41%. Charcot's triad was seen in 29.03%. Biliary pancreatitis was seen in 4.83%. Patients remain asymptomatic in 3.22%.

Post procedural abdominal discomfort was noted in 20 patients. Mild pancreatitis in 5 pts, moderate pancreatitis in 2 pts, perforation in one patient, and cholangitis in 3 patients were observed.

Distal CBD stricture was seen in 10 pts, periampullary diverticulum was seen in 9 pts, choledochal cyst type 1 was seen in one patient, and intra hepatic stones was seen in 2 patients.

Group 2- Patients with CBD stones with no stones in GB

Total number of patients in this group were 25 (male 12, female 13). Mean age of 50.05 yrs. Success rate in this group was 88% (22/25). Failure rate was 12% (3/25). The procedure was successful in 1st attempt in 18 pts, 2nd attempt in 2 pts, and 3rd attempt in 3 pts.

Pain was the predominant presenting symptom in 48%, followed by fever in 52%. and jaundice in 44%, Charcot's triad was seen in 44%. Biliary pancreatitis was seen in 4%. Patients remain asymptomatic in 8%.

Post procedural abdominal discomfort was noted in 8 patients. Mild pancreatitis in 2 pts, moderate pancreatitis in one patient, perforation in one patient, and cholangitis in one patient were observed. No undue bleeding or procedure related mortality were observed.

Distal CBD stricture was seen in 5 pts, periampullary diverticulum was seen in 4 pts, biliary ascariasis was seen in one patient, choledochal cyst type 1 was seen in one patient, and intra hepatic stones was seen in 2 patients.

Group 3- Patients with CBD stones in postcholecystectomy state

Total number of patients in this group were 28 (male 10, female 18). Mean age of 48.7 yrs. Duration after cholecystectomy < 4

weeks in 3 pts, 4 weeks to 6 months in 4 pts, 6 months to 1 year in 6 pts, 1yr to 3yrs in 7 pts, 3yrs to 5yrs in 5 pts, 5yrs to 10yrs in 2 pts, and > 10yrs in 1 patient. Success rate in this group was 96.4% (27/28). Failure rate was 3.57% (1/28). The procedure was successful in 1st attempt in 23 pts, and 2nd attempt in 5 pts.

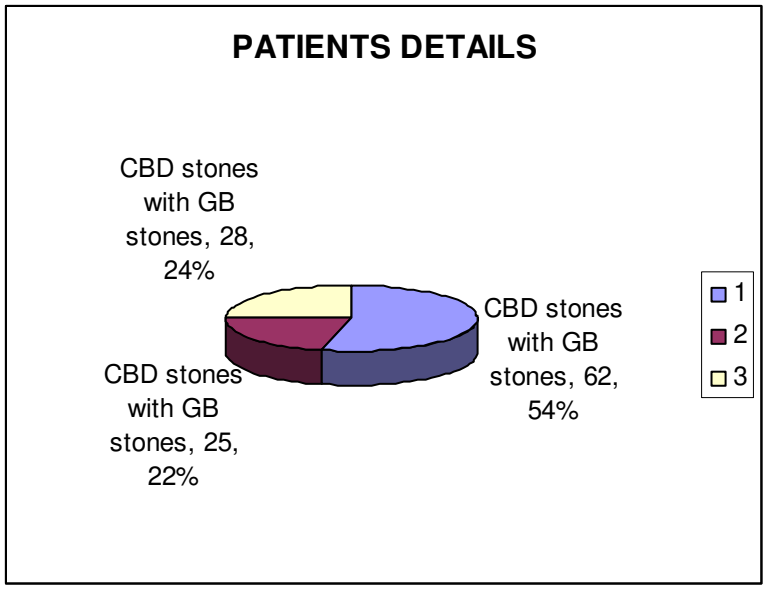
Pain was the predominant presenting symptom in 64.28%, followed by jaundice in 50%, and fever in 42.85%. Charcot's triad was seen in 32.14%. Biliary pancreatitis was seen in 7.14%. No patients remain asymptomatic in this group.

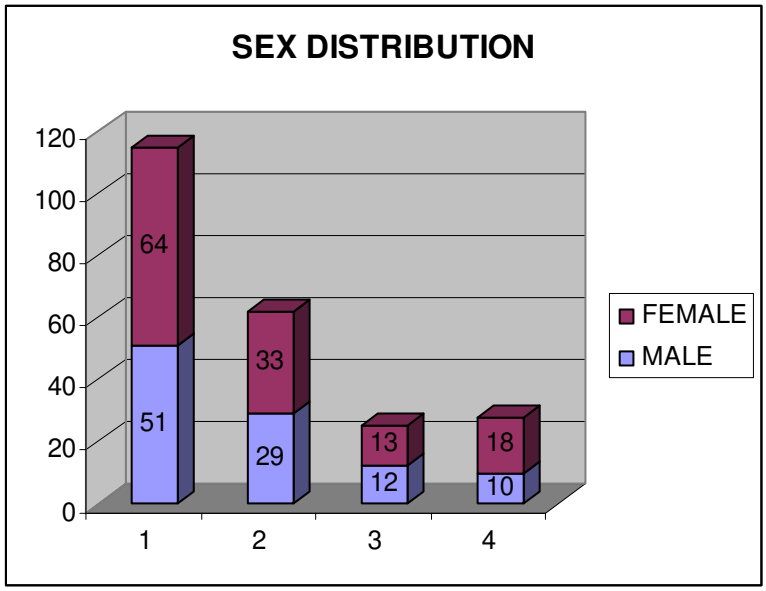
Post procedural abdominal discomfort was noted in 10 patients. Mild pancreatitis in 2 pts, moderate pancreatitis in one patient, and cholangitis in one patient were observed. No undue bleeding or procedure related mortality were observed.

Distal CBD stricture was seen in 4 pts, and periampullary diverticulum was seen in 2 patients.

DEMOGRAPHIC PROFILE

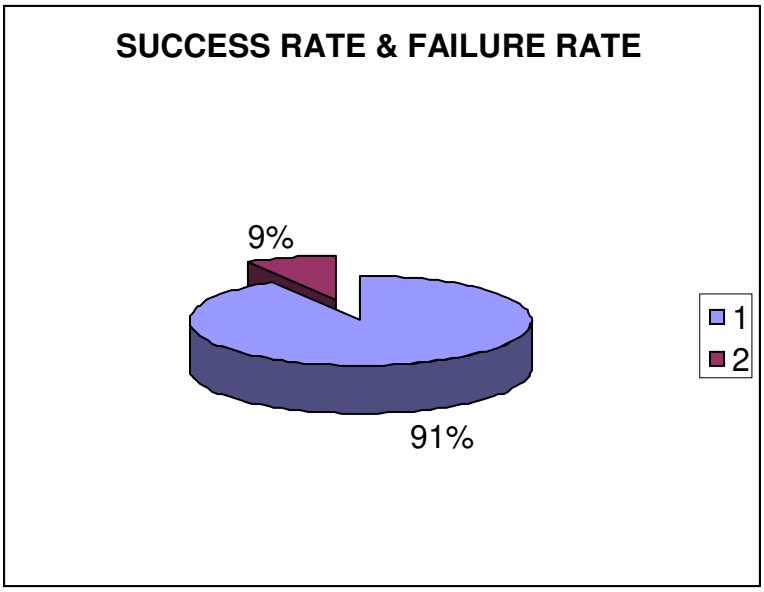
S.N		TOTAL	GROUP-1	GROUP-2	GROUP-3	P value
1	Number	115	62	25	28	
2	Male:Female	51:64	29:33	12:13	10:18	0.568
3	Mean age in years	49.91 (9-76yrs)	51.13 (9-76yrs)	50.05 (20 -65)	48.7 (35-70yrs)	0.20
4.	Success rate	105/115=91.3	56/62=90.32%	22/25=88%	27/28=96.4%	0.51
5.	Failure rate	10/115=8.69% M7:F3	6/62=9.67% M4:F2	3/25=12% M2:F1	1/28=3.57% M 1	0.51
6.	Number of attempts	1^{st} – 95 2^{nd} – 12 3^{rd} – 8	1^{st} – 54 2^{nd} – 5 3^{rd} – 5	1^{st} – 18 2^{nd} – 2 3^{rd} – 3	1^{st} – 23 2^{nd} – 5 3^{rd} – 0	0.104

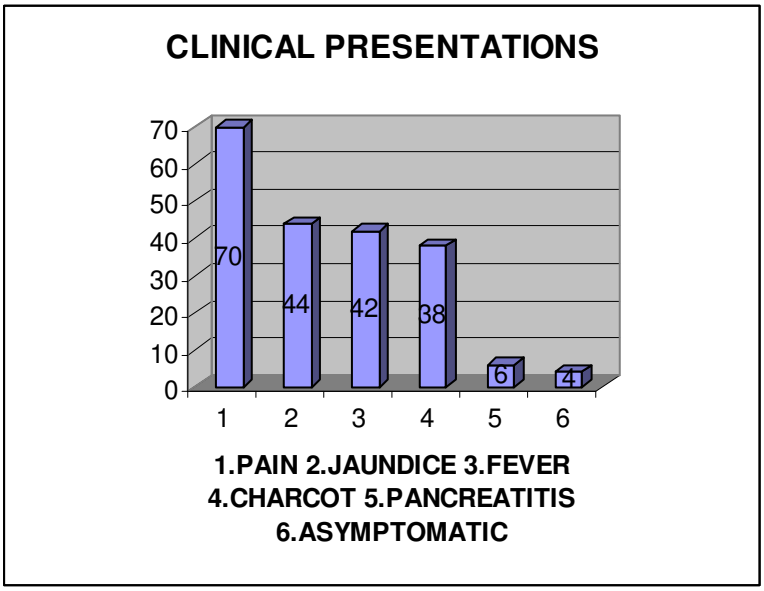

PATIENTS DETAILS
CBD stones with GB stones, 28, 24%
CBD stones with GB stones, 62, 54%
CBD stones with GB stones, 25, 22%
1
2
3


SEX DISTRIBUTION
120
100
80
60
40
20
0
64
51
33
29
13
12
18
10
1
2
3
4
FEMALE
MALE

CLINICAL PRESENTATIONS

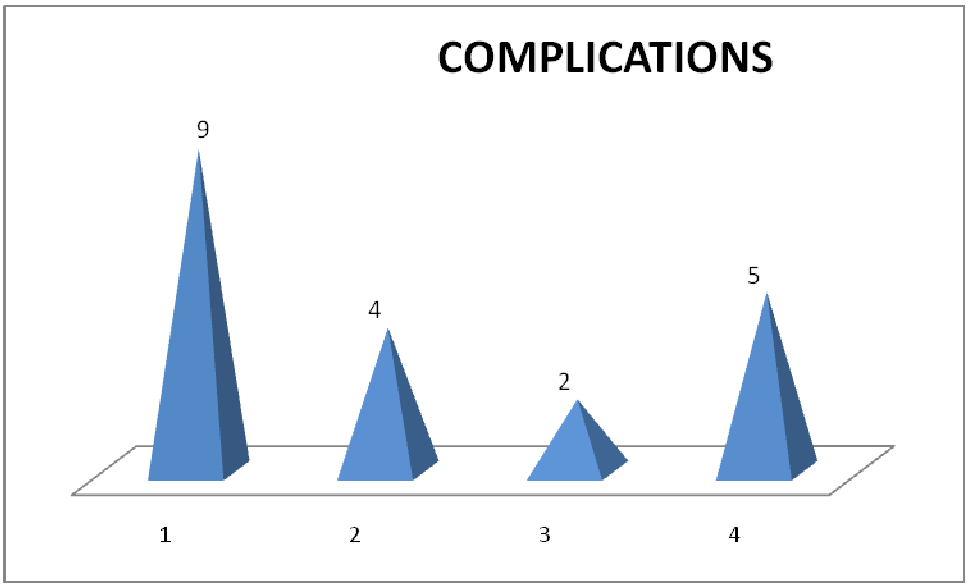
S.NO.	Features	Total	Group – 1	Group-2	Group – 3	P value
1.	Pain	70/115=60.86%	40/62=64.5%	12/25=48%	18/28=64.28%	0.329
2.	Jaundice	44/115=38.26%	20/62=32.25%	11/25=44%	14/28=50%	0.238
3.	Fever	42/115=36.52%	17/62=27.41%	13/25=52%	12/28=42.85%	0.071
4.	Charcots triad	38/115=33.04%	18/62=29.03%	11/25=44%	9/28=32.14%	0.403
5.	Pancreatitis	6/115=5.21%	3/62=4.83%	1/25=4%	2/28=7.14%	0.859
6.	Asymptomatic	4/115=3.47%	2/62=3.22%	2/25=8%	0	0.280

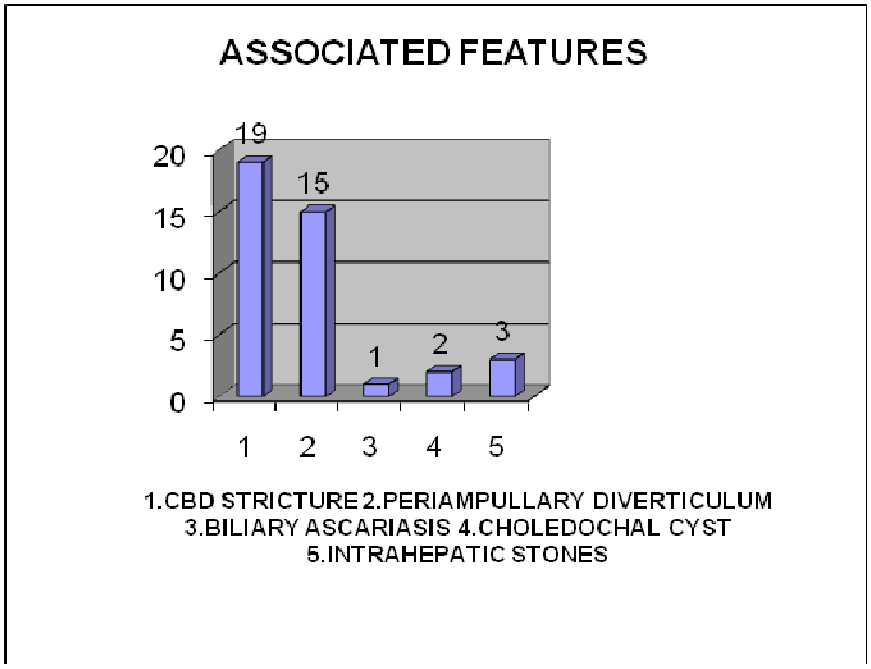

SUCCESS RATE & FAILURE RATE
9%
91%
1
2


CLINICAL PRESENTATIONS
70
60
50
40
30
20
10
0
70
44
42
38
6
4
1
2
3
4
5
6
1.PAIN 2.JAUNDICE 3.FEVER
4.CHARCOT 5.PANCREATITIS
6.ASYMPTOMATIC

COMPLICATIONS

S.NO.	Complications	Total	Group – 1	Group-2	Group – 3	P Value
1.	Abdominal discomfort	38/115=33.04%	20/62=32.25%	8/25=32%	10/28=35.7%	0.942
2.	Pancreatitis-Mild	9/115=7.82%	5/62=8.06%	2/25=8%	2/28=7.14%	0.988
	Moderate	4/115=3.47%	2/62=3.22%	1/25=4%	1/28=3.57%	0.984
3.	Perforation	2/115=1.73%	1/62=1.61%	1/25=4%	0	0.535
4.	Cholangitis	5/115=4.34%	3/62=4.83%	1/25=4%	1/28=3.57%	0.412
5.	Sphincterotomy bleeding	0	0		0	
6.	Mortality	0	0		0	


COMPLICATIONS
9
4
2
5
1
2
3
4


ASSOCIATED FEATURES
19
15
1
2
3
20
15
10
5
0
1
2
3
4
5
1.CBD STRICTURE 2.PERIAMPULLARY DIVERTICULUM
3.BILIARY ASCARIASIS 4.CHOLEDOCHAL CYST
5.INTRAHEPATIC STONES

ASSOCIATED FEATURES

S.NO.	Features	Total	Group – 1	Group-2	Group – 3	P value
1.	Distal CBD stricture	19/115=16.52%	10/62=16.12%	5/25=20%	4/28=14.28%	0.849
2.	Periampullary diverticulum	15/115=13.04%	9/62=14.52%	4/25=16%	2/28=7.14%	0.557
3.	Biliary ascariasis	1/115=0.87%	0	1/25=4%	0	0.163
4.	Choldochal cyst	2/115=1.74%	1/62=1.61%	1/25=4%	0	0.535
5.	Intra Hepatic Stones	3/115=2.60%	2/62=3.23%	1/25=4%	0	0.596

DISCUSSION

DISCUSSION

In this study, the patients were divided into three groups.

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Group 2- Patients with CBD stones with no stones in GB.

Group 3- Patients with CBD stones in postcholecystectomy state.

Various clinical presentations, success rates, complications of endotherapy and associated features in these groups were studied.

Similarly patients with CBD stones were divided into three groups by Kumar et al, AIIMS New Delhi [64]. They studied clinical and biochemical features of different types of CBD stones.

Rakesh K Tandon et al [65] divided patients with CBD stones intotwo groups and studied prevalance and type of biliary stones in India.

In this study 62 patients [71.26%] had GB stones. In Kumar et al's study, 42 patients [56.7%] had GB stones. In my study, 25 patients had isolated CBD stones. Out of these 25 patients five had distal CBD stricture, one had biliary ascariasis, one had type 1 choledochal cyst and two had intra hepatic stones & recurrent pyogenic cholangitis. Others could not have any identifiable risk factors for CBD stones.

In this study overall success rate was 91.3% and failure rate was 8.69%. The procedure was successful in 95 patients in first attempt, 12 patients in second attempt, and 8 patients in third attempt. Other studies did not mention the number of attempts for CBD cannulation. Success rate and failure rate were similar in all three groups (P value 0.510).

CBD could not be cannulated in ten patients. Out of these ten, three had total gastric outlet obstruction, three had Post GJ status with surgically altered anatomy [Billroth II], two had partial gastric outlet obstruction with difficulty in maintaining the scope position and another two had anomalous position of ampulla.

Overall complication rate was 13.04%. Post ERCP pancreatitis occurred in 13 patients [11.30%]. 5 male, 8 female patients. Out of these, 9 [7.82%] had mild and 4 [3.47%] had moderate pancreatitis. Silvano Loperfido et al observed moderate to severe pancreatitis in 1.3% [68]. Martin L Freeman observed pancreatitis in 6.73% of patients.

Mild pancreatitis is defined as clinical pancreatitis, s.amylase atleast three times normal or more at 24 hrs after the procedure and prolongation of planned admission to 2 – 3 days.[67] Moderate pancreatitis requiring hospitalization of 4 – 10 days. Severe pancreatitis requiring

hospitalization of more than 10 days, or pseudocyst or require intervention [21].

In two large prospective studies pancreatitis rates ranged between 0.74% for diagnostic and 1.4% for therapeutic ERCP in one study [36] compared with 5.1% [7 times higher] for diagnostic ERCP and 6.9% [5 times higher] for therapeutic ERCP in another prospective study [28]. Pancreatitis rate in all the 3 groups were same (P value 0.984).

Two patients [1.73%] in my study had perforation after ERCP similar to Freeman et al study [66]. Both of them were treated conservatively and they recovered. P value (0.535) not significant in these groups.

In the study, 5 pts (4.34%) had post ERCP cholangitis. 3 pts in group 1, one patients each in group2 & 3. P value (0.412) not significant. Risk factors for cholangitis after ERCP and sphincterotomy consist primarily of failed or incomplete biliary drainage [70]. All the patients treated with IV antibiotics and they recovered very well.

None of the patients in the study group had post sphincterotomy bleeding and no mortality was observed. Post sphincterotomy bleeding was observed 0.5 – 2 % of patients in Freeman et al study [66].

In this study, CBD stones were slightly more common in females (F 64 pts, M 51 pts). Mean age of presentation was 49.91 years (range 9 – 76 yrs). A. J. Sheen observed Male-to-female ratio was 1: 3 with a median age of 54 years (range: 17–93). [69].

Most common presentation of CBD stones in my study was abdominal pain 60.86%, followed by jaundice 38.26%, and fever 36.52%.. Charcots triad was seen in 33.04% .Biliary pancreatitis was seen in 5.21%. patients remain asymptomatic in 3.47%. A J Sheen et al observed jaundice in 7.1%, pancreatitis in 6.3%, Cholangitis in 6.8%.[69] There was no significant difference in the clinical presentations in all the 3 groups (P value > 0.238).

In this study biliary ascariasis was seen in one patient, choledochal cyst type 1 seen in 2 patients, periampullary diverticulum seen in 15 patients, distal CBD stricture seen in 19 patients, Intra hepatic stones in 3 patients. Patients with CBD strictures dilated with 7 Fr, 10Fr Sohendra biliary dilatation catheters.

In the study biliary stenting was done in 80 patients. All patients with GB stones, distal CBD stricture, intrahepatic stones and multiple large stones were stented with 7 Fr, 10 Fr [Double Pigtail,

Amsterdam] of varying lengths. ESWL was not used because of unavailability of the facility.

Limitations of this study were

1. CBD stone analysis was not done

2.Not using ESWL and not giving duct clearance in all the patients.

3.Number of patients in post cholecystectomy state with CBD stones are less.

CONCLUSION

CONCLUSION

1. Most common presentation of CBD stones in this study was abdominal pain 60.86%, followed by jaundice 38.26%, and fever 36.52%.Charcots triad was seen in 33.04%.

2. In the study, overall success rate was 91.3% and failure rate was 8.69%.

3. Overall complication rate was 13.04%. No post sphincterotomy bleeding was noted. No procedure related mortality was noted. Hence endotherapy are very effective with fewer complications in the treatment of choledocholithiasis.

4. CBD Stones were more common in females (F- 64 pts, M- 51 pts). Mean age of presentation was 49.91 years (range 9 – 76 yrs).

5. Biliary ascariasis was seen in one patient, choledochal cyst type 1 was seen in 2 patients, periampullary diverticulum was seen in 15 patients, distal CBD stricture was seen in 19 patients and intra hepatic stones were seen in 3 patients.

6. There was no statistically significant difference in clinical presentations, associated features, success rate and complications of endotherapy in all the three groups of choledocholithiasis.

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Massimo De Bernardin, MD, Andrea Ederle, MD, Paolo Fina, BSc, Agostino Fratton, MD.

69. Preoperative Determinants of Common Bile Duct Stones During Laparoscopic Cholecystectomy

A. J. Sheen; S. Asthana; A. Al-Mukhtar; M. Attia; G. J. Toogood

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S.NO	NAME	AGE/SEX	DDHDNO	ERCP NO	PRESENTATION	GROUPS	ENDOTHERAPY	COMPLICATIONS	OTHERS

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1	Ranganathan	71/M	1146/08	34/08	Charcots triad	2	BA,ST	ABD.DISCOMFORT	Divert
2	Bhakila	29/F	1120/08	40/08	Fever	1	BA,ST	ABD.DISCOMFORT	
3	Indirani	50/F	2311/08	46/08	pain Fever	1	BA	CHOLANGITIS	
4	Kullammal	60/F	2405/08	47/08	pain Fever	1	BA,ST	MILD PANCREATI	
5	Natarajan	50/M	2625/08	53/08	Charcots triad	2	BA,Bask,St		
6	Manohar	45/m	2643/08	54/08	Jaundice	1	Failed		3A
7	Rajeshwari	45/F	5675/06	59/08	Charcots triad	3	D,BA,Bask,St	ABD.DISCOMFORT	Stricture
8	Karnan	38/M	2685/08	60/08	pain Fever	2	BA,ST		
9	Adhilakshmi	40/F	2741/08	61/08	Jaundice	3	BA,st	CHOLANGITIS	
10	Vijaya	38/F	2854/08	63/o8	Charcots triad	3	Ba	MILD PANCREAT	
11	Baby	50/F	2876/08	70/08	Jaundice	1	BA,Bask,St,D		stricture
12	Ganga	70/F	2797/08	71/08	Jaundice	1	St	ABD.DISCOMFORT	Divert,pa.gr
13	Saravanan	32/M	2758/08	72/08	Charcots triad	2	St	ABD.DISCOMFORT	
14	Rackeljoseph	60/F	2757/08	74/08	pain Fever	3	REN,Ba,Bask,		
15	Rosemary	43/F	2978/08	76/08	Charcots triad	2	BA,Bask,St,D		2A,Stricture
16	Rajan	58/M	2917/08	77/08	pain Fever	1	BA,ST	CHOLANGITIS	
17	Suseela	65/F	2891/08	81/08	pain Fever	1	St		
18	Gopunaidu	63/M	500/03	83/08	Charcots triad	3	BA,Bask,St,D	MILD PANCREAT	stricture
19	Bama	35/F	3076/08	86/08	Charcots triad	1	BA,ST,D	ABD.DISCOMFORT	3A, Stricture
20	Karunakaran	58/M	3253/08	89/08	pain Fever	2	BA,ST		
21	Rukmani	58/f	3365/08	94/08	Charcots triad	1	Ba,Bask,St		
22	Baskar	59/M	3393/08	95/08	Charcots triad	2	BA,Bask,St	ABD.DISCOMFORT	
23	Chitra	26/F	2114/08	98/08	pain Fever	1	BA,ST		
24	Prasanna	30/F	3527/08	100/08	Fever	1	BA,Bask,St,D	ABD.DISCOMFORT	Stricture, ASCARI
25	Narayanan	72/M	2594/07	103/08	Charcots triad	1	BA,Bask,St,D	ABD.DISCOMFORT	3A,stricture
26	Kamala	75/F	3744/08	104/08	Jaundice	2	BA,ST,D		2A,stricture
27	Rudhmary	35/F	3855/08	107/08	pain Fever	1	BA,ST	MODERATE PAN	
28	Vasantha	48/F	4044/08	111/08	pancretitis	1	BA,ST		
29	Malaiammal	45/F	4046/08	113/08	Charcots triad	3	BA,ST	MODERATE PAN	2A
30	Thayarammal	70/F	4445/08	118/08	Charcots triad	3	BA,Bask,St		DIVERTICULUM
31	Vasu	47/M	2709/08	120/08	Jaundice	2	Failed		2A, Divert,GOO
32	Alagammal	53/F	5404/07	126/08	Jaundice Fever	1	BA,ST	ABD.DISCOMFORT	Ch.cyst1a
33	Sengani	70/M	4500/08	127/08	pancreatitis	1	BA,ST	ABD.DISCOMFORT	
34	Amsa	51/F	4591/08	129/08	pain Fever	2	BA,Bask,St		
35	Kathiresan	62/M	3885/06	134/08	pain	3	BA,ST	ABD.DISCOMFORT	
36	Sakunthala	31/F	4596/07	135/08	Charcots triad	1	BA,Bask,St		
37	Eswari	43/F	5081/08	136/08	Charcots triad	3	Ba,ST,D	ABD.DISCOMFORT	Stricture
38	Akilandam	75/F	5128/08	140/08	Charcots triad	1	BA,Bask,St		
39	Abdulrahman	65/M	5244/08	141/08	Charcots triad	2	Ba,st	MILD PANCREATI	
40	Murugan chettiyar	76/M	1040/01	143/08	Jaundice	1	BA,Bask,St		
41	Brindhakumari	50/F	5346/08	142/08	Jaundice Fever	2	Ba		Intrahepatic stones
42	Ameenabee	65/F	4670/08	149/08	asymptomatic	1	Ba,	ABD.DISCOMFORT	Divert
43	Mamtha	70/F	5381/08	152/08	Jaundice	1	BA,ST		Divert,

44	Sankari	70/F	4500/08	153/08	Charcots triad	3	Ba	ABD.DISCOMFORT	
45	Sakila	29/F	1878/08	158/08	pain Fever	3	Ba		
46	Lakshmi	35/F	5889/08	164/08	pain Fever	1	Failed		Partial GOO
47	subramaniyan	54/M	6014/08	167/08	Jaundice	2	BA,Bas,St,D	ABD.DISCOMFORT	Stricture
48	Bharathi	55/F	6069/08	169/08	pain	1	D,BA,ST		G,Stricture
49	Kalimuthu	50/M	6615/08	004/09	Charcots triad	3	BA,st		3A,Divert
50	Ranganayaki	76/F	207/09	008/09	pain	1	Failed	ABD.DISCOMFORT	3A, Post GJ
51	Asanbanu	35/F	3036/06	012/09	Jaundice Fever	1	BA,st,D	MODERATE PAN	stricture
52	Sathyapriya	28/F	354/09	014/09	Jaundice	1	BA, ST		3A
53	Pushpa	65/F	361/09	015/09	Jaundice Fever	1	Ba,st		Divert
54	Kanthasamy	70/M	399/09	018/09	Charcots triad	2	Ba,st,D	MILD PANCREAT	3A,stricture
55	Arumugam	58/M	4695/00	022/09	Jaundice	3	BA,st	ABD.DISCOMFORT	
56	Arivalagan	35/M	463/09	025/09	Jaundice Fever	1	BA,st,D	ABD.DISCOMFORT	stricture
57	Chellapan	45/M	599/09	029/09	pain Fever	1	Ba,st	PERFORATION	3A,ch.pan
58	Duraisamy	74/M	595/09	030/09	asymptomatic	1	Ba,st	ABD.DISCOMFORT	
59	Saraswathi	33/F	725/09	036/09	pancreatitis	2	BA,st,D		stricture
60	Kanthasamy	60/M	595/09	043/09	pain Fever	1	Failed		Fistula
61	Hasina	38/F	870/09	044/09	Charcots triad	3	BA,st	ABD.DISCOMFORT	2A
62	Bhoopathi	70/M	886/09	046/09	pain	1	Ba,st,D		,Stricture
63	Kansiabegum	65/F	897/09	048/09	Charcots triad	2	BA,st	MODERATE PANC	
64	Durai	65/M	1129/09	051/09	pain	1	Ba,st		
65	Mohana	38/F	1151/09	055/09	Jaundice Fever	3	D,BA,ST,D	ABD.DISCOMFORT	2A, Stricture
66	Balammal	55/F	1463/09	057/09	pain	1	Ba,st		
67	Jeyarani	58/F	1985/09	064/09	Charcots triad	2	Failed		Post GJ
68	Ameenabee	65/F	4620/08	065/09	Jaundice	1	St	MILD PANCREATI	Divert
69	Dhanalakshmi	45/F	2337/09	072/09	pain	1	BA,st		
70	Arthi	30/F	2543/09	075/09	pain Fever	1	Ba,st	ABD.DISCOMFORT	
71	Muthusamy	62/M	6383/02	076/09	Charcots triad	1	Ba,St		2A
72	Jayalakshmi	46/F	2619/09	079/09	asymptomatic	2	BA,st	ABD.DISCOMFORT	Divert
73	Narayanan	43/M	2685/09	082/09	pancreatitis	1	Ba,st		
74	Srisha	24/F	2781/09	084/09	pain Fever	1	Ba,st,D		stricture
75	pakkirisamy	48/M	1482/09	087/09	Charcots triad	2	Ba,st	PERFORATION	
76	Thilagavathi	55/F	2758/09	088/09	pain	1	Ba,st		
77	Balammal	65/F	2468/09	95/09	Charcots triad	3	Ba.st	ABD.DISCOMFORT	
78	Rajeshwari	65/F	3532/09	100/09	pain Fever	1	Ba,st		2A,Needle
79	Umamaheswari	41/F	5834/01	107/09	pain Fever	3	Ba		
80	Harikrishnan	24/M	3681/09	108/09	Charcots triad	1	Ba,st	ABD.DISCOMFORT	
81	Rathinavel	44/M	4058/09	121/09	pain	3	Ba		
82	Valliammal	65/F	4886/09	123/09	pain	1	Ba,st		
83	Mariammal	50/F	411/09	124/09	Charcots triad	1	BA,st	ABD.DISCOMFORT	Needle,
84	vijayakumar	31/M	406/09	126/09	pain Fever	1	Ba,st	MILD PANCRETI	2A,Needle
85	Lakshmi	70/F	4462/09	136/09	Charcots triad	2	Ba,st		
86	Rani	35/F	4482/09	137/09	pain	1	D,BA,ST	ABD.DISCOMFORT	

87	Selvakumar	45/M	4540/09	139/09	pain Fever	2	Failed	ABD.DISCOMFORT	Divert, Partial GOO
88	Sridhar	40/M	4667/09	140/09	Charcots triad	3	D,BA,ST		
89	Alagammal	70/F	3527/09	145/09	pain	1	BA,st	MILD PANCREATI	
90	Ameen	66/M	4782/09	149/09	Jaundice	1	BA,st	ABD.DISCOMFORT	In.Hepatic stones
91	Mahalakshmi	52/F	4854/09	150/09	pain	1	BA,st		
92	Karuna	34/M	4803/09	152/09	pain Fever	2	Failed	ABD.DISCOMFORT	Divert
93	Sundarrajan	48/M	4823/09	157/09	pain	1	BA,st		
94	Sivagangaram	48/M	4836/09	158/09	pain Fever	1	Ba,st,D	ABD.DISCOMFORT	stricture
95	Alagan	46/M	4917/09	159/09	Charcots triad	1	BA,st	ABD.DISCOMFORT	Needle
96	Jaimulabdeen	39/M	5142/09	164/09	pain	1	Ba,st		
97	Jaleel	35/M	5173/09	165/09	pain Fever	3	Ba	ABD.DISCOMFORT	
98	Kamalakannan	41/M	5255/09	168/09	pain	1	Ba,St		
99	Kathiresan	38/M	5489/09	172/09	Charcots triad	1	BA,st	MILD PANCREATI	2A,fistula
100	Balakrishnan	60/M	5573/09	173/09	pain	1	Ba.st	MILD PANCREATI	
101	Sanjeevi	53/M	5632/09	175/09	Charcots triad	1	BA,st	ABD.DISCOMFORT	Needle,fistula
102	Gayathridevi	56/F	5557/09	176/09	pain Fever	1	BA,ST		2A
103	Madhan	48/M	5750/09	183/09	asymptomatic	2	BA,st	ABD.DISCOMFORT	Divert
104	Vinothini	9/F	5718/09	185/09	pain	1	BA,st		Ch.CYST
105	Jegan	24/M	5898/09	192/09	Charcots triad	1	BA,st		
106	Kumaravadivel	50/M	6079/09	197/09	Jaundice	3	Ba,st		
107	Pitchumani	68/M	6115/09	199/09	Charcots triad	1	Failed		DU,GOO
108	Anitha	45/F	6171/07	203/09	Jaundice	2	Ba,st,D	CHOLANGITIS	Stricture
109	Gunasekar	37/M	6162/09	204/09	pain	1	Failed	ABD.DISCOMFORT	2A
110	Alamelu	65/F	6185/09	205/09	Jaundice Fever	2	Ba,st		
111	Sridhar	40/M	4667/09	206/09	pain	3	Failed		
112	Dhanalakshmi	50/F	6324/09	217/09	Pancreatitis	3	Ba,st	ABD.DISCOMFORT	
113	Mahalakshmi	39/F	4761/09	219/09	Pancreatitis	3	Ba,st		
114	Rani	47/F	3354/09	226/09	Charcots triad	2	St,D		Stricture
115	Sengaiyan	75/M	6425/09	228/09	pain Fever	1	Ba,st	CHOLANGITIS	

Group 1- Patients with CBD stones with GB stones.

Group 2- Patients with CBD stones with no stones in GB.

Group 3- Patients with CBD stones in postcholecystectomy state

Ba – Balloon trolleying

Bask – Basketing

St – Biliary stenting

D - Bliary dilatation

Divert – Periampullary diverticulum

2A – 2nd attempt

3A – 3rd attempt

GOO- Gastric Outlet Obstruction